

FEB 23 1995

CDM FEDERAL PROGRAMS CORPORATION
a subsidiary of Camp Dresser & McKee Inc.

February 20, 1995

Mr. Chuck Schwer
Sites Management Section
Hazardous Materials Management Division
Department of Environmental Conservation
Agency of Natural Resources
103 South Main Street
West Building
Waterbury, VT 05671-0404

SUBJECT: Contract No.: DACW33-91-D-0004
Delivery Order No.: 012
Final Site Inspection Prioritization Report
Fairbanks Morse Foundry
St. Johnsbury, Vermont
TDD No.: 9401-64-CCX

CERCLIS No.: VTD110878989

DOCUMENT NO.: 6101-012-ST-0329

Dear Mr. Schwer:

One copy of the Final Site Inspection Prioritization Report for Fairbanks Morse Foundry, in St. Johnsbury, Vermont is enclosed. If you have any comments or questions regarding this submittal, please contact me at (617) 742-2659.

Very truly yours,

CDM FEDERAL PROGRAMS CORPORATION

David L. Hill
Delivery Order Manager

DLH/jb

Approved:

Joseph J. Tarantino
Deputy Program Manager

Attachment

cc: Sharon Hayes, EPA Work Assignment Manager (letter only)
Don Smith, EPA Vermont Site Assessment Manager (letter only)
Dan Stenstream, ACOE Engineering Manager (letter only)
Jeffrey Bernard, CDM Federal Site Manager (letter only)



CDM FEDERAL PROGRAMS CORPORATION
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February 20, 1995

Mr. Robert F. Desrochers
Riverfront Enterprises, Inc.
RD #2, Box 66
St. Johnsbury, Vermont 05819

SUBJECT: Contract No.: DACW33-91-D-0004
Delivery Order No.: 012
Final Site Inspection Prioritization Report
Fairbanks Morse Foundry
St. Johnsbury, Vermont
TDD No.: 9401-64-CCX
CERCLIS No.: VTD110878989

DOCUMENT NO.: 6101-012-IN-0328

Dear Mr. Desrochers:

Enclosed is a copy of the Final Site Inspection Prioritization Report for Fairbanks Morse Foundry located in St. Johnsbury, Vermont. The report includes analytical results for samples collected from this property. A sheet on pollution prevention has been included for your information.

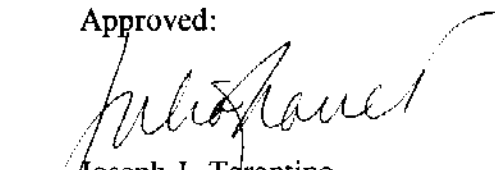
If you have any questions, please contact the U.S. Environmental Protection Agency (EPA) Vermont Site Assessment Manager, Don Smith, at (617) 573-9648.

Very truly yours,

CDM FEDERAL PROGRAMS CORPORATION

David L. Hill
Delivery Order Manager

Approved:


for Joseph J. Tarantino
Deputy Program Manager

Attachment

cc: Sharon Hayes, EPA Work Assignment Manager (letter only)
Don Smith, EPA Site Assessment Manager (letter only)
Dan Stenstream, ACOE Engineering Manager (letter only)
Chuck Schwer, Vermont Site Management Representative (letter only)
Jeffrey Bernard, CDM Federal Site Manager (letter only)

Final Site Inspection Prioritization Report

Fairbanks Morse Foundry

St. Johnsbury, Vermont

Prepared for

U.S. ENVIRONMENTAL PROTECTION AGENCY, Region I
Waste Management Division
Boston, MA

Delivery Order No.: 012
CERCLIS No.: VTD110878989
TDD No.: 9401-64-CCX
Contract No.: DACW33-91-D-0004
Document No.: 6101-012-DR-0325
Prepared By: CDM Federal Programs Corporation
CDM Federal Delivery Order Manager: David L. Hill
Telephone No.: (617) 742-2659
EPA Work Assignment Manager: Sharon Hayes
Telephone No.: (617) 573-5709
ACOE Engineering Manager: Dan Stenstream
Telephone No.: (617) 647-8551
Date Prepared: February 20, 1995

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INTRODUCTION

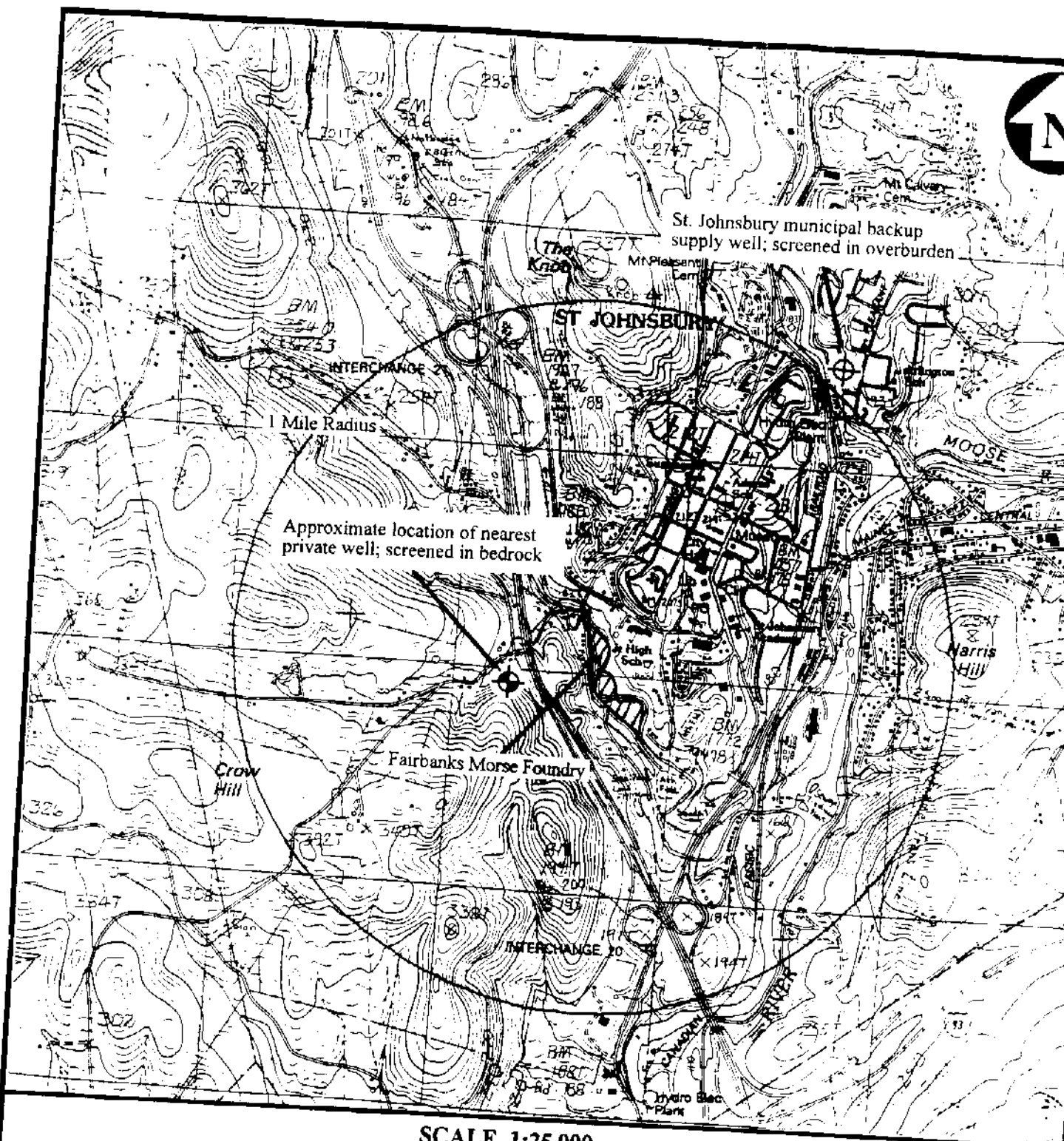
The CDM Federal Programs Corporation (CDM Federal) was requested by the U.S. Environmental Protection Agency (EPA) Region I Waste Management Division, in coordination with the New England Division, Army Corps of Engineers (ACOE) to perform a Site Inspection Prioritization (SIP) of the Fairbanks Morse Foundry property in St. Johnsbury, Vermont. Tasks were conducted in accordance with the ACOE Contract No. DACW33-91-D-0004, the SIP scope of work dated April 28, 1994, (revised July 13, 1994) and technical specifications provided by ACOE under Delivery Order No. 012, which was issued to CDM Federal on July 20, 1994. A Preliminary Assessment (PA) was prepared by the Vermont Agency of Natural Resources, Department of Environmental Conservation (VTANR/DEC) in September 1987. On the basis of the information provided in the PA report, the Fairbanks Morse Foundry Site Inspection was initiated. A Site Inspection (SI) report was prepared by NUS Corporation, Field Investigation Team (NUS/FIT) on September 23, 1991. Updated information encountered during the SIP process is included in this report.

Background information used in the generation of this report was obtained through file searches conducted at EPA, telephone interviews with town officials, conversations with persons knowledgeable of the Fairbanks Morse Foundry property and conversations with other federal, state, and local agencies. Additional information was collected during the CDM Federal onsite reconnaissance on October 14, 1994.

This package follows the guidelines developed under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended, commonly referred to as Superfund. However, these documents do not necessarily fulfill the requirements of other EPA regulations such as those under the Resource Conservation and Recovery Act (RCRA) or other federal, state, or local regulations. SIPs are intended to provide a preliminary screening of sites to facilitate EPA's assignment of site priorities. They are limited efforts and are not intended to supersede more detailed investigations.

SITE DESCRIPTION

Fairbanks Morse Foundry is located off High Street, less than 0.25 mile southeast of Western Avenue in St. Johnsbury, Caledonia County, Vermont (latitude 44° 24' 52.99" N, longitude 72° 01' 51.07" W). It was formerly a foundry and factory site for a scale manufacturing operation (see Figure 1: Location Map) [23]. Information concerning the acreage once occupied by the former foundry was not found in available file material. Riverfront Enterprises, Inc., (present owner of the property) currently owns 18.55 acres along Western Avenue and High Street [6]. The property is not currently in use [9].



SCALE 1:25,000

MILES 1

5

0

Base Map is a portion of the following 7.5' x 15' U.S.G.S. Quadrangle: St. Johnsbury, VT, 1983.

LOCATION MAP
FAIRBANKS MORSE FOUNDRY
ST. JOHNSBURY, VERMONT



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The property is divided by the Sleepers River. Reportedly, the portion of the property on the east bank of the river was where the manufacturing buildings were located. Consultants working at the property during previous investigations, as well as owner representatives, were not able to find an access road to this portion (east bank) of the property. CDM Federal was also unable to access this area. The Sleepers River, bordering the western and southern perimeters, and steep embankments forming the boundaries of the northeastern and eastern sides of the property, impede pedestrian access. No buildings were observed on this eastern portion by CDM Federal (see Figure 2: Site Sketch with Previous Sampling Locations) [14].

The northern portion of the property, west of the Sleepers River, is bordered by Western Avenue, to the west by High Street, and to the east by the Sleepers River. It is accessed via a dirt road off High Street. Two vacant buildings and a recovery shed (associated with an active onsite oil recovery operation) were observed on this portion of the property. North of the larger of the two vacant buildings, concrete slabs were observed; these appear to be foundations of former buildings. Numerous observation, monitoring, and recovery wells are also located on this western portion of the property. These wells were observed to be capped but not locked. Chains at the north and south ends of the dirt roadway can be locked to limit vehicular access to the property. There were no paved areas on this part of the property. Pedestrian access to the portion of the property west of the Sleepers River is unrestricted [14].

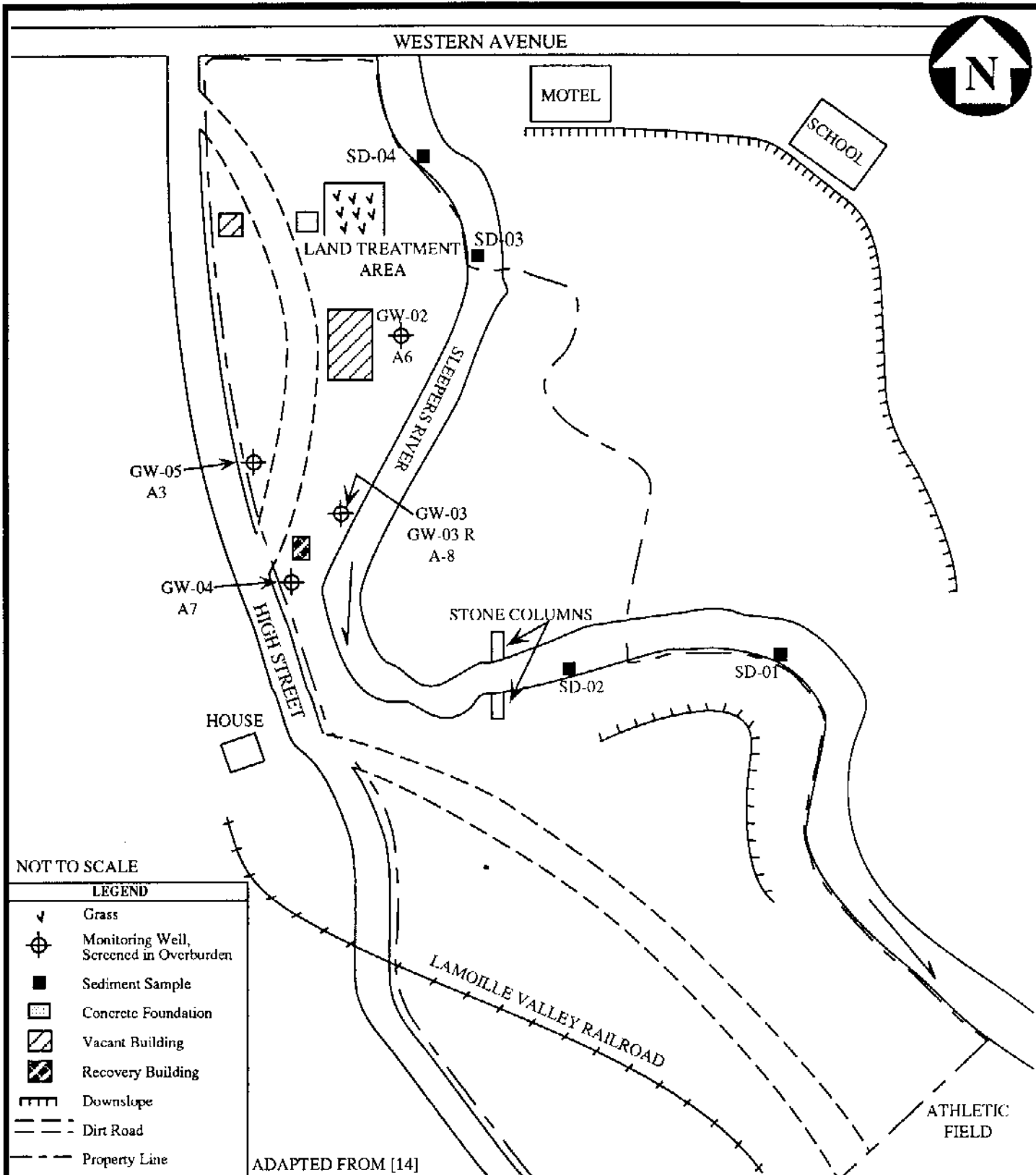
The southern portion of the property, west of the Sleepers River, is also accessed via a dirt roadway off of High Street. CDM Federal observed slag and other wastes scattered around this part of the property. The dirt roadway leads to an athletic field owned by St. Johnsbury Academy [9]. Chains at the north and south ends of the roadway can be locked to limit vehicular access. The southern chain was not locked during CDM Federal's reconnaissance. There were no paved areas on this part of the property. Pedestrian access to this part of the property is unrestricted [9].

The topography of the northern part of the property slopes gently towards the Sleepers River. On the southern portion of the property, the topography slopes more steeply toward the river. Storm water runoff flows overland towards the Sleepers River in both areas. Land use within 0.5 mile of Fairbanks Morse Foundry is primarily residential/commercial [14].

OPERATIONAL AND REGULATORY HISTORY AND WASTE CHARACTERISTICS

The Fairbanks Morse Foundry originated as a grist mill in the early 1800s [23]. In 1830, the grist mill expanded to include a foundry and factory for the production of weighing scales. In 1967, the factory operations were moved to a new location 2.75 miles east (Colt Industries, CERCLIS No. VTD001086131). However, the foundry portion continued to operate at its original location until 1972 [14]. The property is currently owned by Riverfront Enterprises, Inc. [6]. The date of the property transfer is unknown.

There is very little information available concerning the types of wastes generated by the foundry or the methods by which these wastes were disposed of. Reportedly, the manufacturing process of the foundry and factory operation at the Fairbanks Morse Foundry included casting of scale parts, plating, acid etching, and painting. It is believed that the major constituents of the waste



SITE SKETCH WITH PREVIOUS SAMPLING LOCATIONS
FAIRBANKS MORSE FOUNDRY
ST. JOHNSBURY, VERMONT



stream included metals and acids from plating processes, as well as solvents and paint wastes for painting operations [14]. According to the VTANR/DEC PA, constituents of the plating processes included zinc, cadmium, chromium, copper, and lead. Forging involved melting pig iron and scrap iron. The melted iron was then poured into sand molds. The resulting slag and sand wastes were probably disposed of in an onsite dump. The exact location of the dump is unknown, but is possibly south of the former foundry complex [23]. Mercury was used to fill "damping tubes." Painting was done in a dip tank and spray booths. Acid etching was done in tanks containing sulfuric acid. Rinse water from the plating and etching processes was probably disposed of to the river. Floor drains were present in the concrete floors of the plating rooms and probably discharged to the river. Solvent and possibly paint wastes may have been taken to the St. Johnsbury Dump, approximately 0.5 mile south of the Fairbanks Morse Foundry property, for disposal [23]. Based on interviews with former employees, it appears as though many of the wastes generated by the foundry were discharged into the Sleepers River [14]. In addition, it is possible that the contents of plating and etching tanks were dumped into the river when onsite operations ended in 1967.

There have been at least two petroleum spills on the property. The first spill occurred in 1960 when a fuel oil pipe broke and released an unknown quantity of fuel oil. Following this spill, stained soil was removed to a concrete pad on the property. The second spill, involving a release of approximately 6,000 gallons of fuel oil, occurred in 1972 when the aboveground tanks overflowed during a delivery. In 1975, an oily sheen on the Sleepers River was first reported. Soil and the aboveground fuel tanks were subsequently removed. A sheen on the river was again reported in 1984 [14].

The Johnson Company was subsequently hired by Coltec Industries (former property owner) to conduct a site investigation and to remediate the fuel oil release [23]. The remedial work, which is still in progress, has involved the installation of recovery and monitoring wells and the construction of an oil recovery system. Groundwater samples are collected periodically and analyzed for petroleum hydrocarbons [2,14]. Approximately 9,000 gallons of fuel oil has been recovered to date from an estimated 6,000 gallon spill [11]. The remedial goals for the property are to ensure that there is no free product greater than 0.01 inches in all wells throughout the property for 1 year and when there is no longer an active seep to the river [11].

The CERCLA Information System (CERCLIS) discovery date for Fairbanks Morse Foundry was March 14, 1986 [16]. Fairbanks Morse Foundry is not listed in the RCRA Information System (RCRIS) [17]. There is one CERCLA site, St. Johnsbury Dump (VTD988366142), within 1 mile of Fairbanks Morse Foundry [16].

The following is a brief summary of events relating to the Fairbanks Morse Foundry:

- In the late 1960s or early 1970s, a fire destroyed many of the buildings on the Fairbanks Morse Foundry property. The remains of the foundry were demolished and burned in 1985 [23]. Currently, two buildings remain on the property, west of the Sleepers River [14, 23].
- In September 1985, a 6610a Order was issued by the VTANR/DEC requesting a "remedial action plan and schedule to address the long term and ongoing seepage of oily material into the Sleepers River" [1].

- September 1987 - A PA of the Fairbanks Morse Foundry was completed by the VTANR/DEC [23].
- May 14, 1991 - Sediment samples from the Sleepers River, in addition to groundwater samples from onsite monitoring wells, were collected by NUS/FIT on the Fairbanks Property. Analyses of the samples through the EPA Contract Laboratory Program (CLP) detected the presence of several inorganic elements, including mercury in sediments and cyanide in groundwater, that are attributable to onsite activities [14].
- September 23, 1991 - A Draft SI report of the Fairbanks Morse Foundry was completed by NUS/FIT [14].
- October 14, 1994 - CDM Federal conducted a reconnaissance of Fairbanks Morse Foundry [9]. CDM Federal reviewed the ownership status, onsite oil recovery processes, and requested copies of the most recent site remediation reports from a site representative. CDM Federal observed the path of the Sleepers River through the property, the oil recovery operation, the location of buildings, and property accessibility. CDM Federal also attempted to locate the landfill area on the property [9].

Table 1 presents identified structures or areas on the Fairbanks Morse Foundry property that are potential sources of contamination, the containment factors associated with each source, and the relative location of each source.

TABLE 1

Source Evaluation for Fairbanks Morse Foundry

Potential Source Area	Containment Factors	Spatial Location
Landfill for slag, sand molds, and ash from forging and scrap iron	Unknown	Unknown, possibly south of the former foundry complex
Fuel oil land treatment area	Concrete Pad	North of large vacant building
Heavy metals and acids from plating and painting processes	None	Possibly dumped to Sleepers River

[14]

Table 2 summarizes the types of potentially hazardous substances that have been used, disposed of, or stored on the property. The years during which individual hazardous substances were used, disposed of, or stored on the property are not completely documented and have been estimated based on the years of operation of the facility.

TABLE 2
Hazardous Waste Quantity for Fairbanks Morse Foundry

Substance	Quantity or Volume/Area	Years of Use/Storage	Years of Disposal	Source Area
Acetone	Unknown	137	Unknown	Plating and painting processes
Antimony	Unknown	137	Unknown	Plating and painting processes
Arsenic	Unknown	137	Unknown	Plating and painting processes
Barium	Unknown	137	Unknown	Plating and painting processes
Benzene	Unknown	137	Unknown	Fuel oil land treatment area
Beryllium	Unknown	137	Unknown	Plating and painting processes
Cadmium	Unknown	137	Unknown	Plating and painting processes
Copper	Unknown	137	Unknown	Plating and painting processes
Chromium	Unknown	137	Unknown	Plating and painting processes
Cyanide	Unknown	137	Unknown	Plating and painting processes
Ethylbenzene	Unknown	137	Unknown	Fuel oil land treatment area
Iron	Unknown	137	Unknown	Plating and painting processes; landfill
Lead	Unknown	137	Unknown	Plating and painting processes
Magnesium	Unknown	137	Unknown	Plating and painting processes
Manganese	Unknown	137	Unknown	Plating and painting processes
Mercury	Unknown	137	Unknown	Plating and painting processes
Nickel	Unknown	137	Unknown	Plating and painting processes
Sodium	Unknown	137	Unknown	Plating and painting processes
Styrene	Unknown	137	Unknown	Plating and painting processes
Sulfuric acid	Unknown	137	Unknown	Plating and painting processes
Trichloroethene	Unknown	137	Unknown	Fuel oil land treatment area
Xylene (total)	Unknown	137	Unknown	Fuel oil land treatment area
Zinc	Unknown	137	Unknown	Plating and painting processes

[14]

WASTE/SOURCE SAMPLING

The source areas of concern, including rinse water tanks from metals plating and etching processes, are no longer onsite due to closure of the facility in 1967. A fire destroyed many of the buildings on the property in the late 1960s to early 1970s. The remains of the foundry were demolished and burned in 1985. The location of an onsite landfill that was allegedly used for the disposal of sand, slag, and ash wastes from forging and casting processes is unknown and is indistinguishable from the surrounding, heavily overgrown area. As a result, no source sampling has been conducted on the property. Therefore, groundwater samples from Fairbanks Morse Foundry are used for source data. A summary of the groundwater samples collected by NUS/FIT is presented in Table 3.

TABLE 3

**Source Sample Summary: Fairbanks Morse Foundry
Samples Collected by NUS/FIT on May 14, 1991**

Sample Location No.	Traffic Report No.	Remarks	Sample Source
GW-01	MAS689	Blank	Blank for Quality Control
GW-02	MAS685	Grab	Well labelled A6
GW-03	MAS686	Grab	Well labelled A8
GW-03 R	MAS687	Replicate	Same as GW-03
GW-04	MAS688	Grab	Well labelled A7
GW-05	MAS684	Grab	Well labelled A3

Groundwater wells installed by Johnson Company, Inc.

Table 4 presents a summary of compounds and analytes detected through analysis of source samples collected by NUS/FIT. All samples were analyzed for target compound list/target analyte list (TCL/TAL) volatile organic compounds and inorganic elements (including cyanide) through the EPA CLP. As NUS/FIT did not collect a reference sample, a compound or analyte is listed if it occurs at a concentration equal to or greater than the reported sample detection limit (SDL) for inorganic analysis, or the sample quantitation limit (SQL) for organic analysis.

TABLE 4

**Summary of Analytical Results
Source Samples for Fairbanks Morse Foundry
Samples Collected by NUS/FIT on May 14, 1991**

Sample Location	Compound / Element	Sample Concentration (µg/L)	Reference Concentration (µg/L)	Comments
GW-02	Barium	61.3 J	2	30 x SDL
	Calcium	122,000 J	15	8,100 x SDL
	Iron	2,220 J	8	280 x SDL
	Magnesium	10,300 J	29	360 x SDL
	Manganese	111 J	1	100 x SDL
	Potassium	7,780 J	72	110 x SDL
	Sodium	81,300 J	24	3400 x SDL
GW-03	Barium	86.8 J	2	40 x SDL
	Calcium	75,500 J	15	5,000 x SDL
	Iron	28,800 J	8	4,000 x SDL
	Magnesium	6,800 J	29	230 x SDL
	Manganese	4,540 J	1	5,000 x SDL
	Potassium	8,770 J	72	120 x SDL
	Sodium	33,300 J	24	1,400 x SDL
	Cyanide	10.6 J	10	1.1 x SDL
	Benzene	0.062 J	0.01	6 x SQL
	Xylene (total)	0.08	0.01	8 x SQL
GW-03 R	Antimony	22.5 J	17	1.3 x SDL
	Barium	90.2 J	2	50 x SDL
	Calcium	77,400 J	15	5,200 x SDL
	Iron	27,200 J	8	3,000 x SDL
	Magnesium	6,530 J	29	230 x SDL
	Manganese	4,490 J	1	4,000 x SDL
	Potassium	8,770 J	72	130 x SDL
	Sodium	31,500 J	24	1,300 x SDL
	Benzene	0.061	0.01	6.1 x SQL
	Xylene (total)	0.1	0.01	10 x SQL

TABLE 4 (continued)

Sample Location	Compound / Element	Sample Concentration (µg/L)	Reference Concentration (µg/L)	Comments
GW-04	Barium	55.6 J	2	30 x SDL
	Calcium	87,200 J	15	5,800 x SDL
	Iron	18,000 J	8	2,000 x SDL
	Magnesium	4,230 J	29	150 x SDL
	Manganese	6,390 J	1	6,000 x SDL
	Potassium	8,090 J	72	110 x SDL
	Sodium	138,000 J	24	5,800 x SDL
	Benzene	0.011	0.01	1 x SQL
	Xylene (total)	0.037	0.01	3.7 x SQL
GW-05	Barium	135 J	2	70 x SDL
	Calcium	118,000 J	15	7,900 x SDL
	Iron	54,500 J	8	7,000 x SDL
	Magnesium	4,610 J	29	160 x SDL
	Manganese	2,050 J	1	2,000 x SDL
	Potassium	8,670 J	72	120 x SDL
	Sodium	90,800 J	24	3,800 x SDL

J: quantitation is approximate due to limitations identified during the quality control review.
[14]

GROUNDWATER PATHWAY

The bedrock underlying the property is composed of two formations: the Waits River Formation and the Gile Mountain Formation. The Waits River Formation is a rock unit composed of calcareous granolites, schists, and calc-silicates interbedded with quartz mica schist and micaceous quartzite. The Gile Mountain Formation is similar except that it contains a greater proportion of quartz and a lesser proportion of calcite [14]. The depth to bedrock is unknown.

Surficial soils in the St. Johnsbury region are generally of glaciolacustrine, glaciofluvial, and post glaciofluvial origin [23]. Soils in the immediate area of the Fairbanks Morse Foundry property are alluvial. To the north and south, silty clays are prevalent. To the northeast and east are lake sands and a north-south trending esker. To the west, gravel is present in kame terraces. Based on information from soil borings on the northwest portion of the property, it appears that the soil to a depth of 5 feet is composed of fill over fine-to-medium light brown to buff sand. From 5 to 14 feet in depth, gray sandy silt occurs, and between 14 and 25 feet, soils are a fine to coarse sand [23].

The depth to the water table at Fairbanks Morse Foundry ranges from 6 to 10 feet below ground

surface. Groundwater studies conducted at the Fairbanks Morse Foundry property indicate that flow is either to the southeast, parallel to the Sleepers River, or to the east, towards the river [14]. The state of Vermont has not established a network to monitor groundwater quality [22].

The only municipal groundwater source identified within 4 miles of the property is the back-up well for the town of St. Johnsbury. There is a wellhead protection area for this well [24]. This well, located approximately 1 mile north-northeast, is maintained as a backup source to Stiles Pond. The backup well has a potential pumping rate of 1.5 million gallons per day [12]. In an emergency, the well could potentially serve the whole system (3,000 connections/8,160 people) [8]. Stiles Pond is the primary municipal water supply for St. Johnsbury and is located 4 miles east of the facility at a higher elevation [4, 8]. Table 5 presents the public groundwater supply sources within 4 miles of Fairbanks Morse Foundry.

TABLE 5
Public Groundwater Supply Sources Within 4 Miles of
Fairbanks Morse Foundry

Distance/ Direction from Property	Source Name	Location of Source	Estimated Population Served	Source Type*
1 mile / north - northeast	Backup well	St. Johnsbury	8,160	Overburden

*Overburden, Bedrock, or Unknown.
[8, 12]

Based on U.S. Census Bureau data, it is estimated that 399 private water supply wells are located within 4 miles of Fairbanks Morse Foundry, serving approximately 1,422 people [10].

The nearest private well is within 0.25 mile [10]. Table 6 lists the estimated drinking water populations served by groundwater sources within 4 miles of Fairbanks Morse Foundry.

TABLE 6

**Estimated Drinking Water Populations Served by Groundwater Sources
Within 4 Miles of Fairbanks Morse Foundry**

Radial Distance From Fairbanks Morse Foundry (miles)	Estimated Population Served by Private Wells	Estimated Population Served by Public Wells	Total Estimated Population Served by Groundwater Sources Within the Ring
0.00 - 0.25	4	0	4
> 0.25 - 0.50	11	0	11
> 0.50 - 1.00	38	0	38
> 1.00 - 2.00	166	8,160	8,326
> 2.00 - 3.00	302	0	302
> 3.00 - 4.00	901	0	901
TOTAL	1,422	8,160	9,582

[10, 12]

CDM Federal did not conduct any groundwater sampling for this SIP. On May 14, 1991, NUS/FIT collected groundwater samples from onsite monitoring wells. Samples were analyzed for TCL/TAL organic and inorganic contaminants. Contaminants detected in the groundwater at concentrations greater than three times background included the following (and their maximum concentrations): barium (135 micrograms per liter [$\mu\text{g/L}$]), iron (54,500 $\mu\text{g/L}$), magnesium (10,300 $\mu\text{g/L}$), manganese (6,390 $\mu\text{g/L}$), sodium (138,000 $\mu\text{g/L}$), cyanide (10.6 $\mu\text{g/L}$), benzene (0.062 $\mu\text{g/L}$), xylene (0.100 $\mu\text{g/L}$), antimony (22.5 $\mu\text{g/L}$), calcium (122,000 $\mu\text{g/L}$), and potassium (8,770 $\mu\text{g/L}$). A summary of the groundwater samples collected by NUS/FIT is presented in Table 7.

TABLE 7

**Groundwater Sample Summary: Fairbanks Morse Foundry
Samples Collected by NUS/FIT on May 14, 1991**

Sample Location No.	Traffic Report No.	Remarks	Sample Source
GW-01	MAS689	Blank	Blank for Quality Control
GW-02	MAS685	Grab	Well labelled A6
GW-03	MAS686	Grab	Well labelled A8
GW-03 R	MAS687	Replicate	Same as GW-03
GW-04	MAS688	Grab	Well labelled A7
GW-05	MAS684	Grab	Well labelled A3

Groundwater wells installed by Johnson Company, Inc.

[14]

Table 8 presents a summary of compounds and analytes detected through analysis of groundwater samples collected by NUS/FIT. All samples were analyzed for TCL/TAL volatile organic compounds and inorganic elements (including cyanide) through the EPA CLP. As NUS/FIT did not collect a reference sample, a compound or analyte is listed if it occurs at a concentration equal to or greater than the reported sample detection limit (SDL) for inorganic analysis, or the sample quantitation limit (SQL) for organic analysis.

TABLE 8

**Summary of Analytical Results
Groundwater Samples for Fairbanks Morse Foundry
Samples Collected by NUS/FIT on May 14, 1991**

Sample Location	Compound / Element	Sample Concentration (µg/L)	Reference Concentration (µg/L)	Comments
GW-02	Barium	61.3 J	2	30.6 x SDL
	Calcium	122,000 J	15	8,100 x SDL
	Iron	2,220 J	8	280 x SDL
	Magnesium	10,300 J	29	360 x SDL
	Manganese	111 J	1	111 x SDL
	Potassium	7,780 J	72	110 x SDL
	Sodium	81,300 J	24	3400 x SDL
GW-03	Barium	86.8 J	2	40 x SDL
	Calcium	75,500 J	15	5,000 x SDL
	Iron	28,800 J	8	4,000 x SDL
	Magnesium	6,800 J	29	230 x SDL
	Manganese	4,540 J	1	5,000 x SDL
	Potassium	8,770 J	72	120 x SDL
	Sodium	33,300 J	24	1,400 x SDL
	Cyanide	10.6 J	10	1.1 x SDL
	Benzene	0.062 J	0.01	6 x SQL
	Xylene (total)	0.08	0.01	8 x SQL

TABLE 8 (continued)

Sample Location	Compound / Element	Sample Concentration (µg/L)	Reference Concentration (µg/L)	Comments
GW-03 R	Antimony	22.5 J	17	1.3 x SDL
	Barium	90.2 J	2	50 x SDL
	Calcium	77,400 J	15	5,200 x SDL
	Iron	27,200 J	8	3,000 x SDL
	Magnesium	6,530 J	29	230 x SDL
	Manganese	4,490 J	1	4,000 x SDL
	Potassium	8,770 J	72	130 x SDL
	Sodium	31,500 J	24	1,300 x SDL
	Benzene	0.061	0.01	6.1 x SQL
	Xylene (total)	0.1	0.01	10 x SQL
GW-04	Barium	55.6 J	2	30 x SDL
	Calcium	87,200 J	15	5,800 x SDL
	Iron	18,000 J	8	2,000 x SDL
	Magnesium	4,230 J	29	150 x SDL
	Manganese	6,390 J	1	6,000 x SDL
	Potassium	8,090 J	72	110 x SDL
	Sodium	138,000 J	24	5,800 x SDL
	Benzene	0.011	0.01	1.1 x SQL
	Xylene (total)	0.037	0.01	3.7 x SQL
GW-05	Barium	135 J*	2	70 x SDL
	Calcium	118,000 J	15	7,900 x SDL
	Iron	54,500 J	8	7,000 x SDL
	Magnesium	4,610 J	29	160 x SDL
	Manganese	2,050 J	1	2,000 x SDL
	Potassium	8,670 J	72	120 x SDL
	Sodium	90,800 J	24	3,800 x SDL

J: quantitation is approximate due to limitations identified during the quality control review.
 [14]

SURFACE WATER PATHWAY

The probable point of entry (PPE) of overland flow from the property is to the Sleepers River, which flows through the property. The Sleepers River flows southeast for approximately 0.75 mile where it empties into the Passumpsic River. The Passumpsic River flows south for approximately 8 miles before emptying into the Connecticut River which flows south for 6.25 miles where it reaches the 15-mile target distance limit (TDL) [14]. Table 9 presents the water bodies within the surface water pathway of Fairbanks Morse Foundry.

TABLE 9
Water Bodies Within the Surface Water Segment of
Fairbanks Morse Foundry

Surface Water Body	Descriptor ^a	Length of Reach	Flow Characteristics (cfs) ^b	Wetlands
Sleepers River	Small to moderate stream	0.75 miles	66.5	None
Passumpsic River	Moderate to large stream	8 miles	747	< 1 mile
Connecticut River	Large stream to river	6.25 miles	4,730	None

^a Minimal stream. Small to moderate stream. Moderate to large stream. Large stream to river. Very large river. Coastal tidal waters. Shallow ocean zone or Great Lake. Deep ocean zone or Great Lake. Three-mile mixing zone in quiet flowing river.

^b Cubic feet per second.

[14, 18, 19, 20, 21]

There are no municipal drinking water intakes along the Sleepers, Passumpsic, or Connecticut Rivers within the 15-mile TDL [3, 4, 5, 7]. All waters along the 15-mile TDL are Class B [26]. The Sleepers River has been designated as a potential drinking water source by the VTANR/DEC Water Quality Division, but is not currently in use [14]. The only wetlands in the 15-mile TDL are on the Passumpsic River with a frontage of less than 1 mile [15].

Recreational activities for the Sleepers, Passumpsic, and Connecticut Rivers include boating, swimming, and recreational sport fishing. However, boating and swimming are limited in the Sleepers River due to low water levels during the summer months. Both the Sleepers and Passumpsic Rivers are cold water streams. Primary fish habitats found along the downstream pathway of the Sleepers River are for rainbow trout and brown trout. Fish habitats within these portions of the Sleepers River reportedly have been "negatively affected" by the construction of Interstate 91 and by industrial processes associated with the former Fairbanks Morse Foundry [14]. Representatives of VTANR/DEC and of the Johnson Company, found fishing line on the property during the October 14, 1994, CDM Federal reconnaissance indicating that a fishery exists in on the Sleepers River in the vicinity of Fairbanks Morse Foundry [9]. Primary fish habitats found in the lower Passumpsic River include brown trout and the minnow family Cyprinidae. Fish habitats found within the TDL of the Connecticut River include brook, brown, and rainbow trout; large and small mouth bass; pike; pickerel; walleye; and bullhead [25].

CDM Federal did not conduct sediment sampling for this SIP. On May 14, 1991, NUS/FIT collected sediment samples from Fairbanks Morse Foundry in the Sleepers River. Samples were analyzed for organic and inorganic contaminants. Contaminants detected in the river sediments include: arsenic (6.3 milligrams per kilogram [mg/Kg]), beryllium (0.32 mg/Kg), copper (1,574 mg/Kg), lead (161 mg/Kg), mercury (0.37 mg/Kg), zinc (5,180 mg/Kg), manganese (819 mg/Kg), and nickel (37.2 mg/Kg). A summary of the sediment samples collected by NUS/FIT is presented in Table 10.

TABLE 10

**Sediment Sample Summary: Fairbanks Morse Foundry
Samples Collected by NUS/FIT on May 14, 1991**

Sample Location No.	Traffic Report No.	Remarks	Sample Source
SD-01	AZ580	Farthest downstream sample	Sleepers River
SD-02	AZ581	Downstream sample	Sleepers River
SD-03	AZ582	Upstream of large vacant building	Sleepers River
SD-03D/R	AZ583	Replicate of SD-03	Sleepers River
SD-04	AZ584	Reference Sample	Sleepers River
SD-05	AZ585	Blank for Quality Control	Sleepers River

[14]

Table 11 presents a summary of compounds and analytes detected at concentrations greater than three times background in sediment samples collected by NUS/FIT. The reference concentrations used in the evaluation of Fairbanks Morse Foundry are the concentrations of the compounds or analytes detected in the background location (SD-04). Background concentrations are presumed to be unaffected by the property.

If a compound or analyte is not detected in the reference sample, the SQL of the reference sample for organic analysis, or SDL of the reference sample for inorganic analysis, is used as the reference value. Accordingly, a compound or analyte is listed only if it occurs at a value equal to or greater than the corresponding SQL or SDL in the reference sample.

TABLE 11

**Summary of Analytical Results
Sediment Sample for Fairbanks Morse Foundry
Samples Collected by NUS/FIT on May 14, 1991**

Sample Location	Compound / Element	Sample Concentration (mg/Kg)	Reference Concentration (mg/Kg)	Comments
SD-01	Arsenic	3.3	0.6	6 x SDL
	Beryllium	0.32	0.31	1.0 x SDL
	Copper	444	37.2	11.9 x REF
	Lead	161 J	4.6 J	35 x REF
	Mercury	0.37 J	0.13	2.8 x SDL
	Zinc	174 J	25.3 J	6.88 x REF
	Acetone	0.19 J	0.016	12 x SDL
SD-02	Arsenic	6.3	0.5	13 x SDL
	Beryllium	0.27 J	0.25	1.1 x SDL
	Copper	1574	37.2	42.3 x REF
	Iron	27600	9110	3.03 x REF
	Lead	106 J	4.6 J	23 x REF
	Manganese	819	208	3.94 x REF
	Zinc	5180	25.3 J	205 x REF
SD-03	Beryllium	0.30 J	0.24	1.3 x SDL
SD-03 D/R	Nickel	37.2	11.7	3.18 x REF

mg/Kg: milligrams per kilogram

SQL: sample quantitation limit

J: quantitation is approximate due to limitations identified during the quality control review

[14]

SOIL EXPOSURE PATHWAY

Surface soils in the St. Johnsbury region are generally of glaciolacustrine, glaciofluvial (ice contact origin) and post glaciofluvial (recent alluvium). Soils in the immediate area of Fairbanks Morse Foundry are alluvial [14]. No soil sampling has been conducted on the Fairbanks Morse Property [9, 14, 23].

There is currently no activity (employees, residents, schools) on the Fairbanks Morse Foundry property [8]; nor are there any terrestrial sensitive environments [13]. The nearest resident to the Fairbanks Morse property is within 100 feet of the western property boundary [9]. There are approximately 2,033 people living within 1 mile of the property [10].

Vehicular access to the northwestern portion of the property is limited by a chain across the entrance. On the southern portion of the property, chains at the north and south ends of the roadway can be locked to prevent vehicular access. Pedestrian access to both portions of the property is unrestricted. Access to the eastern portion of the property is restricted by the Sleepers River to the south and west and by steep slopes to the north and east [9].

AIR PATHWAY

The nearest resident to the Fairbanks Morse property is within 100 feet of the western property boundary [9]. Approximately 2,033 people live within 1 mile of the property and approximately 6,869 live within 4 miles of the property [10]. Table 12 lists the estimated population within 4 miles of Fairbanks Morse Foundry.

TABLE 12

Estimated Population Within 4 Miles of Fairbanks Morse Foundry

Radial Distance From Fairbanks Morse Foundry (miles)	Estimated Population
0.00 - 0.25	75
> 0.25 - 0.50	560
> 0.50 - 1.00	1,398
> 1.00 - 2.00	2,088
> 2.00 - 3.00	1,435
> 3.00 - 4.00	1,313
TOTAL	6,869

[10]

One state designated threatened species habitat (ram's head lady's slipper), one endangered species habitat (sheathed sedge), and one state designated natural area (Northern white cedar swamp) are located within the 4-mile radius of the property [13].

During CDM Federal's October 14 reconnaissance, total VOC concentrations were monitored with a MiniRAE photoionization detector (PID). No concentrations above background were detected [9].

SUMMARY

Fairbanks Morse Foundry is an 18.55-acre property along Western Avenue and High Street in St. Johnsbury, Caledonia County, Vermont. The property is divided by the Sleepers River. Two vacant buildings and a recovery shed are located on the western portion of the property. Also west of the river are numerous observation, monitoring, and recovery wells. The section east of the river is overgrown with vegetation and is inaccessible because bridges across the river are gone.

Fairbanks Morse Foundry originated as a grist mill in the early 1800s. In 1830, the grist mill expanded to include a foundry and factory for the production of weighing scales, operating until 1967. In the late 1960s or early 1970s, a fire destroyed many of the buildings on the Fairbanks Morse Foundry property. The remains of the foundry were demolished and burned in 1985. The Vermont Agency of Natural Resources, Department of Environmental Conservation (VTANR/DEC) investigated the property in 1987 because of an ongoing petroleum contamination problem and the waste disposal associated with previous manufacturing activities.

Most, if not all of the wastes generated by the foundry are believed to have been discharged into the Sleepers River. In addition, it is possible that the contents of plating and etching tanks were dumped into the river when onsite operations ended in 1967. Wastes from forging processes are believed to have been dumped in an onsite landfill. The exact location of the landfill is unknown, but is possibly on the southern portion of the property. Several fuel oil spills have also occurred at Fairbanks Morse Foundry.

Groundwater and sediment studies conducted at Fairbanks Morse Foundry by NUS/FIT on May 14, 1991, indicate that metals and organic compounds have been released to the environment. Groundwater samples detected the following contaminants: barium (30 to 70 x sample detection limit [SDL]), calcium (5,000 to 8,100 x SDL), iron (280 to 7,000 x SDL), magnesium (150 to 360 x SDL), manganese (111 to 6,000 x SDL), potassium (110 to 130 x SDL), sodium (1,300 to 5,800 x SDL), cyanide (1 x SDL), benzene (1.1 to 6.1 x sample quantitation limit [SQL]), xylene (3.7 to 10 x SQL), and antimony (1.3 x SDL). Sediment samples indicate that the Sleepers River and an onsite fishery have been contaminated with the following contaminants: arsenic (6 to 13 x SDL), beryllium (1.0 to 1.3 x SDL), copper (11.9 to 42.3 x background), lead (23 to 35 x background), mercury (2.8 x SDL), zinc (6.88 to 205 x background), acetone (12 x SDL), manganese (3.94 x background), and nickel (3.18 x background).

The only municipal groundwater source identified within 4 miles of the property is the back-up well for the town of St. Johnsbury. This well, approximately 1 mile north-northeast, is maintained as a backup source to Stiles Pond. There is a wellhead protection area for this well. Approximately 8,160 people are potentially served by the backup well for the town of St. Johnsbury. About 1,422 people are served by private groundwater sources within 4 miles of Fairbanks Morse Foundry.

The probable point of entry of hazardous substances from the Fairbanks Morse Foundry property to the surface water pathway is on the Sleepers River, which flows through the property. The Sleepers River flows southeast for approximately 0.75 mile where it empties into the Passumpsic River. The Passumpsic River flows south for approximately 8 miles before emptying into the Connecticut River, which flows south for 6.25 miles where it reaches the 15-mile Target Distance Limit (TDL). The average annual flows of the Sleepers, Passumpsic, and Connecticut Rivers are 66.5, 747, and 4,730 cubic feet per second (cfs), respectively. No public drinking

water intakes currently exist along the 15-mile downstream surface water pathway of Fairbanks Morse Foundry. Fishing line found at Fairbanks Morse Foundry indicates that a fishery exists on the Sleepers River in the vicinity of the property.

Approximately 2,033 people live within 1 mile radial distance of the property and approximately 6,869 people living within 4 miles radial distance of the property. Within 4 miles of Fairbanks Morse Foundry, one state designated threatened species (ram's head lady's slipper), one state designated endangered species (sheathed sedge), and one state designated natural area (Northern white cedar swamp) are found.

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